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- Proceedings of the 19th WSEAS American Conference on Applied Mathematics (AMERICAN-MATH '13)
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Plenary Lecture 1

On a Hybrid Algorithm for Convex Programming Problems

Professor Yixun Shi
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Abstract: Many interior point methods for convex programming solve an (n+m)-by-(n+m) linear system in each iteration. In this paper, two iterative methods for solving linear systems are combined together and embedded into interior point methods. Based on that, a hybrid algorithm for solving convex programming problems is proposed.

Brief Biography of the Speaker: Yixun Shi graduated with a B.S. degree in mathematics from Anhui Normal University, China in 1981, and then with a M.S. degree in mathematics from Shanghai Normal University, China in 1984. From 1984 to 1987 he taught in the Department of Mathematics of Shanghai Normal University, China. From 1987 to 1992 He studied in the University of Iowa, USA, and graduated in 1992 with a Ph.D. degree in mathematics. Since then he has been a faculty member of the Department of Mathematics, Computer Science and Statistics at the Bloomsburg University of Pennsylvania, USA, serving as an assistant professor from 1992 to 1996, an associate professor from 1996 to 2000, and a full professor since 2000. His research interests include numerical optimization and nonlinear system of equations, scientific computing, computational statistics, mathematical modeling, financial mathematics, and mathematics education. He is author of a number of books and more than 50 papers published in international journals and conference proceedings. He has also delivered keynote speeches at various international conferences.

Plenary Lecture 2

Double Compartment Cellular Automata Modeling of HIV Proliferation Under Plasmapheresis Treatment

Professor Yongwimon Lenbury
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Abstract: In this work, we apply the Monte Carlo Cellular Automata Simulation technique to study the dynamics of human immunodeficiency virus (HIV) proliferation and the action of virus-immune system in the human body in fighting the disease. Double-compartment model is utilized to take into account the blood as well as the lymph node compartments. Efficacy of treatments by plasmapheresis and its and combination with drug prescriptions are studied. We investigate the impacts of different treatment protocols on the ability of the infected patients to fight the development of AIDS symptoms. In particular, the possibility of interrupted or alternate treatment will be illustrated by CA simulations with appropriately chosen system parameters.

Brief Biography of the Speaker: After Professor Yongwimon Lenbury obtained her Ph.D. in Mathematics from Vanderbilt University, USA, she returned to the Department of Mathematics, Faculty of Science, Mahidol University to teach, and conduct research in dynamical modeling of nonlinear systems in biology and medicine. She was appointed professor of Mathematics in 1996. Prof. Lenbury has been involved in research work in the field by Mathematical Modelling and Nonlinear Systems in Biology and Medicine. Her work involves dynamical modelling and analysis of nonlinear systems such as food chains coupled by parasitic infections, hormone secretion systems in the human body, and so on. Of particular interest are the pacemaker oscillations and rhythmogenesis in human mechanism which have been proposed as a way to differentiate sickness from health. For example, some of her works involves the construction and analysis of a model for insulin kinetics and the identification of oscillatory behavior subject to various feeding regimens. Her recent interest has been concentrated in the signal transduction system involving GPCR, a major drug target. She received an award from the National Research Council as the Outstanding Researcher in the field of Physical Science in the year 1998. Her continued achievements have resulted in her being granted the prestigious position of Senior Researcher of the Thailand Research Fund in Mathematics, 2000-2002 and a Fellow of the Royal Institute of Thailand. Collaborating with several researchers in various countries such as the United States, Germany, Italy, and New Zealand, Prof. Lenbury has been devoted to the promotion of research and education in the field of Mathematics in Thailand.

Plenary Lecture 3

Finding All the Minimizers of Higly Multimodal Functions by using a Monte-Carlo Technique

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Université de Lille Nord de France
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Abstract: Multimodal benchmark functions are essential for testing and comparing the effectiveness of global meta-heuristic optimization methods, such as with the genetic algorithms or the particle swarm optimization methods. In many test-functions, a large number of local minimizers coexist with a single (or few) global minimizer(s). Anyway, this situation increases the difficulty to find the global optimum points. Finding the local minimizers may be also profitable in the real-world problems, since some local minimizers may be a "best" choice for economic or computational cost reasons. The two-dimensional Shubert test functions with box constraints from B.O. Shubert (1972) belong to a cosine class with a high number of minimizers. The Shubert function I has 760 minimum points, 18 of which are global optimum points in 9 regular distributed clusters. However, the Shubert function III with additive square expressions has a single global minimizer. The n-dimensional Levy sine functions for n= 4, 5, 6, 7 from A.V. Levy et al. (1981) have respectively 7.1E4, 1E5, 1E6 and 1E8 local minimizers.
The purpose of this study is to estimate the distribution of multiple local minimizers. A simple Monte-Carlo method consists in choosing at random the starting points of the local minimization problems. The stochastic search iterative procedure is made of different steps for finding all the minimizers. At the first step, the boxed search space is regularly divided into small areas. At each iteration, a starting point is selected at random in each sub-box. Thereafter a local minimizer is searched in these small areas. In the following steps, all the minimizers are sorted according to their objective value, the doubles are eliminated automatically and a number of local minimizers is deduced. (minus the number of global minimizers). The whole process is being repeated a hundred of times or more. An empirical distribution of the minimizer numbers is obtained, for which we deduce the value statistical parameters. The computations are carried out by using the software Wolfram Mathematica ® 7, which allows interactive applications with controls, to vary the value of parameters.

Brief Biography of the Speaker: André A. Keller (Prof.) is at present an associate researcher from the "Multi-agent Systems and Behaviors" division of LIFL (Lille Fundamental Computer Science Laboratory), a research unit UMR8022 of the French Centre National de la Recherche Scientifique (CNRS) by the Université de Lille 1, Sciences et Technologies. He received a PhD in Economics (Operations Research) in 1977 from the Université de Paris Panthéon-Sorbonne. He is a WSEAS Member since 2010 and a Reviewer for the ELSEVIER journal Ecological Modelling, the Journal Mathematical Analysis and Applications (jmaa) and WSEAS Transactions on Information Science and Applications. He taught applied mathematics (optimization techniques) and econometric modeling, microeconomics, theory of games and dynamic macroeconomic analysis. His experience centers are on building and analyzing large scale macro-economic models, as well as simulating economic policies, and forecasting. His research interest has concentrated on: high frequency time-series modeling with application to the foreign exchange market, on discrete mathematics (graph theory), stochastic differential games and tournaments, circuit analysis, optimal control in a fuzzy context. His publications consist in writing articles, books and book chapters. The book chapters are e.g. on semi-reduced forms (Martinus Nijhoff, 1984), econometrics of technical change (Springer and IIASA, 1989), advanced time-series analysis (Woodhead Faulkner, 1989), circuits enumeration (Springer, 2008), stochastic differential games (Nova Science, 2009), optimal fuzzy control (InTech, 2009), fuzzy games (Nova Science, 2010). One book is on "Time-Delay Systems:with Applications to Economic Dynamics & Control" (LAP, 2010). One another book is on "Nonconvex Optimization in Practice: Theory, Algorithms and Applications" (WSEAS Press, under review).

Plenary Lecture 4

On a Generalized Equilibrium

Professor Massimiliano Ferrara
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Abstract: Game theory plays an important role to understand some economical dynamics. The Nash equilibrium (equilibrium point) is the most important solution concept of the noncooperative game theory and it is defined in terms of the normal form of a game, as a strategy combination with the property that no player can gain by unilaterally deviating from it. In the original definition of J.F.Nash, the players options were expressed by utility functions defined on the product of the individual strategy spaces, and the most significant existence results refer to this formalization. Later, the original definition was extended to cover more general situations met in the noncooperative competitions. This is the case of the equilibrium of abstract economies (Shafer and Sonnenschein, where the individual preferences are represented as correspondences). Particularly, such correspondences can be derived from the normal form of a game, but as primary elements of the model they generalize the earlier representations of individual preferences. Motivated by the problem of the implementation in noncooperative solutions of the voting operators, a new concept of equilibrium, called Nash equilibrium in choice form, has been introduced (Stefanescu and Ferrara, 2006). Rephrased in terms of game strategies and renamed as equilibrium in choice, this concept is discussed in the present paper. The formal framework for the definition of equilibria in choice is the game in choice form, represented as the family of the sets of individual strategies and a choice profile. Intuitively, a choice profile specifies the desirable outputs of each player, and since each output of the game is associated to a game strategy, it can be represented as a collection of subsets of the set of all game strategies. Particularly, when the players options are represented by utility functions or by preference relations, a choice profile may be the family of the graphs of players best reply mappings, and then the set of equilibria in choice coincides with the set of Nash equilibria. So that, the definition of the equilibrium in choice captures the main idea of the "best reply" from the definition of the Nash equilibrium, but the new concept is more general, responding to various representations of the players options. Two variants of this concept are proposed here. The basic one presumes a relaxation of the best reply principle and has obvious counterparts for classical solutions, if this relaxation is accepted. The stronger form of the equilibrium in choice can be considered as a generic notion of noncooperative solution and several usual versions of such solutions are produced when the choice profile is designed indifferent particular ways.

Brief Biography of the Speaker: Massimiliano Ferrara is Professor of Mathematical Economics at "Mediterranea" University of Reggio Calabria where he was also Dean of the degree in Economics (2007-2010). Actually he is the Director of Department - Culture, Education, Research and University at Regione Calabria. He was the Founder and Director of MEDAlics (2009) - Research Centre for Mediterranean Studies - and Vice Rector at "Dante Alighieri" University of Reggio Calabria. He was also Visiting Professor at Harvard University, Cambridge (USA), Morgan State University in Baltimore (USA), Western Michigan University (USA), New Jersey Institute of Technology in Newark (NJ) (USA). He was an invited speaker at several WSEAS international conferences. Author of 120 papers on ISI journals Member of Indian Academy of Mathematics (2008- current), Member of Accademia Peloritana dei Pericolanti (2003-current), Member of the Balkan Society of Geometers (2003- current), Member of AMASES - Associazione di Matematica Applicata alle Scienze Economiche e Sociali - (2003- current), Member of the Scientific SET - Advances Center for Studies on Economic Theory - (Center for Advanced Studies Theoretical Economics) at the University of Milan Bicocca (2005-current), Member of the Mathematical Association of America (2007-current), Member of the SIEP (Societa italiana di Economia Pubblica) (2008-current). Scientific Coordinator of international projects financed by the Ministry of Foreign Affairs:the Executive Programme of scientific and techonological cooperation between Italy and Romania during 2006- 2008 and of the Executive Programme of scientific and technological cooperation between Italy and Estonia during 2005-2007. Editor and referree of several International Journals. Official Reviewer of Mathematical Reviews (MathSciNet), Division of the American Mathematical Society and Zentralblatt MATH, reviews scientific journal published by the European Mathematical Society, the Heidelberg Academy of Sciences and Fachinformationszentrum Karlshruhe. His main research interests are: dynamical systems, patterns of growth and sustainable development, mathematical economics, game theory, optimization theory, applied Economics.

Plenary Lecture 5

Behavior of the Maximum Entropy Routing in Computer Networks

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Abstract: Maximum entropy method is used for many different optimizations, often for uderdetermined systems or when objective function has to be introduced. Applications range from image processing to crystallography and chemistry or economics and network design. Suitability of the maximum entropy method for the network design problem, which includes topology, routing and possibly capacity assignment, was already investigated. Algorithms were developed that use the maximum entropy method and some heuristics to find good quality network design problem solutions. In this lecture we investigate theoretical behavior of the maximum entropy method applied to the network design problem and possible uses of these theoretical results for initial settings that improve convergence speed of the mentioned algorithms.

Brief Biography of the Speaker: Milan Tuba is Professor of Computer Science and Provost for mathematical, natural and technical sciences at Megatrend University of Belgrade. He received B. S. in Mathematics, M. S. in Mathematics, M. S. in Computer Science, M. Ph. in Computer Science, Ph. D. in Computer Science from University of Belgrade and New York University. From 1983 to 1994 he was in the U.S.A. first as a graduate student and teaching and research assistant at Vanderbilt University in Nashville and Courant Institute of Mathematical Sciences, New York University and later as an Assistant Professor of Electrical Engineering at Cooper Union Graduate School of Engineering, New York. During that time he was the founder and director of Microprocessor Lab and VLSI Lab, leader of scientific projects and supervisor of many theses. From 1994 he was Assistant professor of Computer Science and Director of Computer Center at University of Belgrade, from 2001 Associate Professor, Faculty of Mathematics, and from 2004 also a Professor of Computer Science and Dean of the College of Computer Science, Megatrend University Belgrade. He was teaching more than 20 graduate and undergraduate courses, from VLSI Design and Computer Architecture to Computer Networks, Operating Systems, Image Processing, Calculus and Queuing Theory. His research interest includes mathematical, queuing theory and heuristic optimizations applied to computer networks, image processing and combinatorial problems. He is the author or coauthor of more than 130 scientific papers and coeditor or member of the editorial board or scientific committee of number of scientific journals and conferences. Member of the ACM 1983, IEEE 1984, New York Academy of Sciences 1987, AMS 1995, SIAM 2009.

Plenary Lecture 6

Neoclassical Analysis as a Tool for Optimization

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Abstract: Mathematics is an efficient tool for modeling real world phenomena because mathematics reflects and studies the most fundamental level of nature, the structural level. However, in its essence, mathematics is opposite to real world because mathematics is exact, rigorous and abstract while real things and systems are imprecise, vague, and concrete. To lessen this gap, mathematicians elaborate methods that make possible to work with natural vagueness and incompleteness of information using exact mathematical structures. The most acknowledged of these approaches to this problem are fuzzy set theory, set-valued analysis, and interval analysis. Neoclassical analysis is a synthesis of these fields with the classical calculus. The aim of this synthesis is to extend the powerful technique of the classical calculus to a much broader scope, to make this technique more relevant to the situation in physics and computation.

Neoclassical analysis extends methods of classical calculus to reflect uncertainties that arise in computations and measurements. In it, ordinary structures of analysis, that is, functions, sequences, series, and operators, are studied by means of fuzzy concepts: fuzzy limits, fuzzy continuity, and fuzzy derivatives. For instance, continuous functions, which are studied in the classical analysis, become a part of the set of the fuzzy continuous functions studied in neoclassical analysis.

Aiming at representation of inexactness, vagueness, uncertainty, and imprecision by extending the scope of the classical calculus and analysis, neoclassical analysis makes, at the same time, methods of the classical calculus more precise with respect to real life applications. Consequently, new results are obtained extending and even completing classical theorems. In addition, facilities of analytical methods for various applications also become more broad and efficient.

As an example of neoclassical analysis applications, we consider fuzzy optimization in several variables with orientation at numerical methods. Although there are optimization techniques that do not use derivatives of the objective function, experts in numerical analysis advise using derivative information whenever possible. Neoclassical analysis provides such possibilities for a much wider range of objective functions than classical analysis.

Brief Biography of the Speaker: Dr. Mark Burgin received his M.A. and Ph.D. in mathematics from Moscow State University and Doctor of Science in logic and philosophy from the National Academy of Sciences of Ukraine. He was a Professor at the Institute of Education, Kiev; at International Solomon University, Kiev; at Kiev State University, Ukraine; and Director of the Assessment Laboratory in the Research Center of Science at the National Academy of Sciences of Ukraine. Currently he is working at UCLA, USA. Dr. Burgin is a member of New York Academy of Sciences and an Honorary Professor of the Aerospace Academy of Ukraine. He is a Editor-in-Chief of the international journals Integration and Information, Associate Editor of the International Journal on Computers and their Applications and International Journal of Swarm Intelligence & Evolutionary Computation, and Member of the Editorial Board of the Journal of Mathematical and Computational Science and TrippleC. Dr. Burgin is a member of the Science Advisory Committee at Science of Information Institute, Washington. He was a member of organizing and program committees of more than 50 conferences. He also organized and directed several ongoing research seminars in mathematics and computer science, such as Theoretical Computer Science (UCLA) and Foundations of Mathematics and Information Sciences (National Academy of Sciences of Ukraine). Dr. Burgin is doing research, has publications, and taught courses in various areas of mathematics, computer science, information sciences, system theory, artificial intelligence, software engineering, logic, psychology, education, social sciences, and methodology of science. He originated such theories as the mathematical theory of technology, system theory of time, general information theory, theory of named sets, hyperprobability theory and neoclassical analysis (in mathematics) and made essential contributions to such fields as foundations of mathematics, theory of algorithms, theory of knowledge, theory of intellectual activity, and complexity studies. His practical experience includes design of operating systems

for supercomputers, CAD systems for electrical engineering and problem oriented languages for such systems, databases for biological information, and general expert systems, as well as mathematical modeling of databases and expert systems. Dr. Burgin has authorized and co-authorized more than 500 papers and 19 books, including “Theory of Named Sets” (2011), “Theory of Information” (2010), “Measuring Power of Algorithms, Computer Programs, and Information Automata” (2010), “Neoclassical Analysis: Calculus Closer to the Real World” (2008), “Super-recursive Algorithms” (2005), “On the Nature and Essence of Mathematics” (1998), “Intellectual Components of Creativity” (1998), “Fundamental Structures of Knowledge and Information” (1997), “Introduction to the Modern Exact Methodology of Science“ (1994), “The Structure-Nominative Analysis of Theoretical Knowledge (1992), and “The World of Theories and Power of Mind” (1992).

Plenary Lecture 7

Using Systems Dynamics Formalism as Base for an Innovative Hybrid Modeling Approach: Methodology and Case Study

Professor Roberto Revetria
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Energetica, della Produzione,
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Abstract: Simulation is the best tool used for any non-trivial, real world system. For analysis of complex systems, simulation is often used prior to the operation of the real world system as a mediator for a dynamic situation. Therefore, simulation methodology has been recommended and chosen to analyze, for example, container terminal systems. This paper considers and compares two models for port simulation approach: Discrete-Event Simulation (DES) and System Dynamics (SD). Both simulation approaches started and evolved almost simultaneously with the advent of computers, but very little communication existed between these fields. This is however, changing at present with more DES or SD academics and practitioners showing an interest to enter the other world. DES models systems as a network of queues and activities, where state changes occur at discrete points of time, whereas SD models consist of a system of stocks and flows where continuous state changes occur over time. In DES the objects (entities) are individually represented and can be tracked through the system. Specific attributes are assigned to each entity and determine what happens to them throughout the simulation. On the other hand, in SD entities are presented as a continuous quantity. In DES state changes occur at discrete points of time, while in SD state changes happen continuously at small segments of time (Δt). Specific entities cannot be followed throughout the system. DES models are stochastic in nature with randomness incorporated through the use of statistical distributions. SD models are generally deterministic and variables usually represent average values. Despite the differences listed, it is claimed that the objective of models in both simulation approaches is to understand how systems behave over time and to compare their performance under different conditions. Existing work on the comparison of DES and SD is scarce. In the few studies found, comparisons tend to be biased towards either the DES or SD approach. The views expressed consist mainly of the authors' personal opinions based on their own area of expertise. Little understanding exists regarding the differences and similarities between the two simulation approaches, let alone understanding when should one approach be used instead of the other.
The ports are very intensive production realities respect to regular facilities: 24h work time per day, 365 days working in a year, all-weather operations are just some of the stressing factor of this sector; port facilities involve big investments and require special operative and management skills. Both models (SD and DES) are used in this study to resolve problem of port simulation (in Arabian gulf region). The goal is to provide a study about two different models that are not alternative but can be integrated. The models considered in this study are two. The goal of Dry Bulk model consists into evaluate the Dry Bulk storage capacity for every kind of material in order to ensure the total annual throughput, in according with the feasibility study assumption reported into the Master plan document about berths, dock cranes and transportation means. The goal of Container terminal model consists into evaluate the container stacking/storage capacity best configuration in order to ensure the total annual throughput and minimize the shuffling moves, standing the feasibility study assumption reported into the Master plan document about berths, dock cranes and transportation means. Modular approach has been considered resulting in a 10-stocking yard for the first stage configuration (up to 2028-2030) and 20 stocking yard for the final configuration (over 2038). The model developed considers, for each stocking yard, the following modules: shipping module, stocking yard module, horizontal transportation module (with Terminal Tractor). For each stage configuration the evaluated output are: number of container and TEUs (Twenty-Foot Equivalent Unit)/ year (total annual throughput), number of container and TEUs / ship (average parcel size), ship calls / year, average number of STS cranes moves / hour, average yard utilization coefficient, average container crossing time, average stacking height (for each storage area block served by one RTG). The simulation run length considered is 2 years for each scenario.

The results of this study suggest that it is possible use both approaches: Discrete-Event Simulation and System Dynamics to simulate the port.

Brief Biography of the Speaker: He earned his degree in mechanical engineering at the University of Genoa and he completed his master thesis in Genoa Mass Transportation Company developing an automatic system integrating ANN (Artificial Neural Networks) and simulation with the ERP (Enterprise Resource Planning) for supporting purchasing activities. He had consulting experience in modeling applied to environmental management for the new Bosch plant facility TDI Common Rail Technology in construction near Bari. During his service in the Navy as officer, he was involved in the development of WSS&S (Weapon System Simulation & Service) Project. He completed is PhD in Mechanical Engineering in 2001 defending his Doctoral thesis on “Advances in Industrial Plant Management” by applying Artificial intelligence and Distributed Simulation to several Industrial Cases. Since 1998 is active in Distributed Simulation by moving US DoD HLA (High Level Architecture) Paradigm from Military to Industrial application. In 2000 he succesfully led a research group first demonstrating practical application of HLA in not dedicated network involving a 8 International University Group. He is currently involved, as Full Professor, in the DIME of Genoa University, working on advanced modeling projects for Simulation/ERP integration and DSS/maintenance planning applied to industrial case studies (Contracting & Engineering and Retail companies). He is active in developing projects involving simulation with special attention to Distributed Discrete Event and Agent Based Continuous Simulation (SwarmSimulation Agents). He is teaching Modelling & Simulation, VV&A, Distributed Simulation (HLA), Projecty management in Master Courses Worldwide and he is teaching Industrial Plants Design in University of Genoa Masters' Courses. He is member of SCS, IASTED, ACM, ANIMP, AICE, WSEAS. He is also Scientific Responsible of Iso Sistemi srl Simulation Division.

Plenary Lecture 8

Integrating Dynamic Traffic Assignment and Demand Responsiveness in Road Infrastructure Maintenance Optimization Problems

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Abstract: Highway Infrastructure, such as pavement, bridges, and tunnels deteriorate over time, primarily due to vehicle miles of travel, weather, and other factors. Maintenance of road infrastructure elements is a key task generally undertaken by city, county, and highway agencies. Due to budget constraints, it is highly desirable to develop a cost effective optimal maintenance plan over a future planning horizon that will ensure adequate service level along highway segments in a given highway network. The existing maintenance optimization models for highway infrastructure do not account for the dynamic nature of traffic assignment between specified Origin-Destination pairs and demand responsiveness. In this presentation we present a mathematical optimization model that considers dynamic traffic assignment characteristics and demand responsiveness in highway infrastructure maintenance optimization. We exploit several heuristics to solve the optimization model and present some case studies using real highway network data from the Baltimore City Department of Transportation.

Brief Biography of the Speaker: Dr. Manoj K. Jha is Professor and Founding Director of the Center for Advanced Transportation and Infrastructure Engineering Research (CATIER) in the department of civil engineering at the Morgan State University, Baltimore, MD, USA. His research interests are in developing computational models for sustainable transportation infrastructure design and route optimization. Dr. Jha has authored (or co-authored) tree books and more than 160 peer-reviewed articles in journals, books, and conference proceedings in the highway design, infrastructure, optimization, and transportation literature. He is an associate editor of the Open Civil Engineering Journal, and editorial board member of several international journals, including the Journal of Infrastructure Systems, and the International Journal of Operations Research and Information Systems. He has delivered over 20 invited, keynote, and plenary speeches at international conferences and institutions.

Plenary Lecture 9

Application Genetic Algorithm in Optimizing Traffic Control

Professor Riza Atiq Rahmat
Director of Centre for Academic Advancement and
Head of Intelligent Transport System
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Abstract: Urban Traffic Control in developing countries is always a never ending problem due to rapid motorization. Optimization of traffic control is one way to reduce this problem. In this experiment, Genetic Algorithm was adopted to optimize a traffic light and offset between intersections. The objective functions are minimizing delay at an intersection and maximize traffic progressive flows along an arterial road. The experiment was conducted in real time on a stretch of arterial road in Bangi, Malaysia which consists of 5 intersections. Traffic data for the input such as traffic flows, queue lengths and traffic speed are collected using video detection system. For this purpose, a video camera is mounted facing every approach in the study area. The digital images from the camera were analyzed in real time. The experience shows that the traffic control performance is improved up to 56% during off-peak hours and 34% during peak-hours.

Brief Biography of the Speaker: Prof. Ir. Dr Riza Atiq obtained his B.Eng. (Civil Engineering) in 1980, M.Eng (Tranportation Engineering) in 1991 from UTM and PhD (ITS) from UKM in 2002. He started his academic carrier in UKM in 1994 after working as an engineer with City Hall of Kuala Lumpur for 14 years. While in City Hall he developed a transport model for Kuala Lumpur and surrounding area for planning purposes. He has five intellectual properties, three books, more than 100 scientific research papers and 14 innovation awards including one from Geneva, three from Korea and one from IEM. His research is mainly in Intelligent Transport System and learning-teaching. His professional expertise includes bridge design, urban transport planning, urban transport management and sustainable urban transport. His current post in Universiti Kebangsaan Malaysia (UKM) is the Director of Centre for Academic Advancement. While holding the post, he initiated the formulation of 11 policies to transform the curriculum and teaching-learning practices in UKM. His professional qualification includes being a professional engineer (Civil Engineers, Board of Engineers Malaysia) and member of Road Engineering Association of Asia and Australasia.